

WILL MY LIGHTS GO OUT THIS SUMMER?

On hot summer days, businesses and consumers may worry about whether there will be enough electricity to go around. These periods of peak electric load can pose a real threat if the demand for electricity exceeds the supply; resulting blackouts can cripple regions within a city or state.



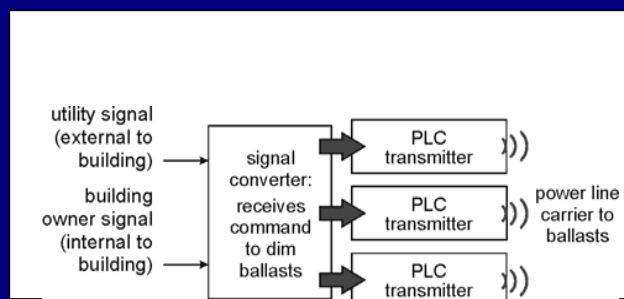
Building new power plants is an expensive approach to handling rising loads. Demand management, a broad topic that includes many methods for reducing peak-period electricity usage, is an economical alternative for controlling peak loads. Lighting control, in particular, is a very effective demand management strategy:

- Shedding lighting load is repeatable, predictable, and immediate.
- Dimming electric lighting by up to 40 percent for brief periods is acceptable to occupants in an office setting.
- Dimming, as opposed to switching, maintains a lights-on appearance.

Because few off-the-shelf technologies exist to implement demand management, PIER researchers developed a low-cost load-shed ballast that trims lighting power and lighting levels by 33 percent.

LOAD-SHEDDING BALLAST DEVELOPMENT

THE LIGHTING RESEARCH CENTER (LRC) DEVELOPED A PROTOTYPE LOAD-SHEDDING BALLAST. THIS HIGHLY EFFICIENT INSTANT-START UNIT INCLUDES STEP DIMMING AND A BUILT-IN POWER LINE CARRIER (PLC) SIGNAL RECEIVER FOR AUTOMATED DIMMING RESPONSE. THE RESEARCH TEAM IS WORKING WITH A MAJOR BALLAST MANUFACTURER, A PLC MANUFACTURER, AND AN ELECTRIC UTILITY TO COMMERCIALIZE THE TECHNOLOGY AND CONDUCT A FIELD TEST. APPEARANCE, INSTALLATION, AND WIRING ARE IDENTICAL TO STANDARD INSTANT-START BALLASTS.



Load-shedding ballast technology

Until now, controlling fluorescent lighting loads required customized solutions with expensive hardware and installation. The load-shedding ballast avoids the cost and complexity associated with traditional dimming methods.

LIMITED DIMMING IS WIDELY ACCEPTED

Building owners and utilities alike will benefit from electric grid stability by avoiding costly peak power and blackouts. Tests show that building occupants accept and hardly notice when lighting is dimmed by 33 percent, and installing the load shed ballast offers about 30 percent demand savings off the connected fixture lighting load. Demand reductions within California from this technology could grow to 1.2 megawatts per year.

Benefits

- Cost effective installation, with \$9 per ballast additional cost expected.
- Simple payback in 3–6 years for new installation or retrofit projects, assuming current California rates and 100 hours in load-shed mode.
- Limited dimming is preferred to switching off lighting to maintain occupant productivity and satisfaction and does not reduce lamp life.
- High efficiency operation, losing only 1 percent efficiency in load-shed mode.
- Instant-start lamp operation for reliable, high efficacy lighting, enabling parallel lamp operation and easy wiring.
- Universal input voltage (120 or 277 volt) minimizes stocking.
- High power factor (>0.9) and low total harmonic distortion (<10 percent) minimize utility impacts.
- Unique simplified PLC signaling system provides response time in less than two minutes.
- Flexible transmitter design accepts load-shedding signal from many different communication systems.

INTERESTED?

Building owners/managers, utility staff, contractors, design engineers, building owners/managers, and code developers can use the information on the load-shedding lighting technology.

Key next steps include:

- Complete demonstration of 200 load-shedding ballasts and utility-to-ballast signaling system planned for a New York office building.
- Commercialize the technology (in progress with a major ballast manufacturer and a PLC company).
- Publicize product availability and benefits after it becomes available.
- Develop electric rates to promote the use of load shedding ballasts.
- Consider code changes to require load shedding ballasts in new buildings.
- After they become available, include load-shedding ballasts in new construction and retrofit projects.

This project was part of the PIER Lighting Research Program. To view the project results, as well as other current research activities, visit www.energy.ca.gov/pier.

Additional information about this technology can be found at:

- PIER contractor site:
www.archenergy.com/lrp/demandresp_lighting/project_3_2.htm
- PIER researcher site:
www.lrc.rpi.edu/ResearchTopics/ReducingBarriers/LoadManagementSolutions.asp



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LOAD-SHEDDING BALLAST



**COST-EFFECTIVELY
REDUCING PEAK
ELECTRIC DEMAND**



Public Interest
Energy Research